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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/768,804	01/30/2004	Norman Rubin	00100.03.0041	9333

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EXAMINER	
NGUYEN, PHILLIP H	

ART UNIT	PAPER NUMBER
2191	

MAIL DATE	DELIVERY MODE
09/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/768,804	RUBIN ET AL.	
	Examiner	Art Unit	
	Phillip H. Nguyen	2191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20070801*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the amendment filed on 6/12/2007.

2. Claims 1-4, 8-13, 15-16 and 18-21 have been amended.

3. Claims 1-21 remain pending and have been considered below.

Response to Arguments

4. Applicant's arguments filed 6/12/2007 have been fully considered but they are not deemed persuasive.

Applicant asserts on page 26 of the amendment that Ng fails to teach or consider a previous value number as expressly required in the claim and the value numbers compared in the Ng reference do not appear to be either operation value numbers or previous value numbers but instead appear to be operand value numbers.

Examiner respectfully disagrees with all the allegations as argued. First, the specification discloses "...*the value numbers of all inputs (i.e., operands) to generate a first hash value*." In other words, applicant indicates that the value numbers are the operand value numbers. By definition, *an instruction (or expression) consists of two types of components: operands and operators*. All instructions (or expressions) have at least one operand. Second, Ng teaches the value numbers are the numbers assigned to the expressions (or instructions) (see at least col. 5, line 53). Ng also teaches the hash key (or hash value) consists of the op-code plus all its operands (see col. 7, lines 52-53). In other words, when hashing an expression (or instruction) the whole

expression is a hash key for retrieving, searching, etc. Furthermore, Ng uses previous value numbers (*e.g., VNi is a previous value number to VNj and VNk is a new value number*) for comparing to generate a new value number (see at least col. 8, lines 16-25)).

Applicant asserts on page 27 of the amendment that Ng fails to teach retrieving an operation value number. Further asserts that "retrieving an operation value number..." and "generating a result value number..." are not analogous.

Examiner respectfully disagrees with the allegation as argued. First, the specification discloses, "*The operation value number is an n-tuple value number, wherein n represents the number of components of the superword register.*" By definition, n-tuple value number is a list of n value numbers. Second, examiner did not mention that "retrieving an operation value number..." and "generating a result value number..." are analogous. Examiner clearly indicated in the office action that in order to perform the comparison between value numbers, a retrieving process must be performed to obtain the value numbers. Ng teaches the hash key (hash value) consists of the op-code and plus all the operands (e.g., value numbers) (see at least col. 7, lines 52-53). In other words, op-code and operands when hashed are the keys for retrieving, searching, etc. Furthermore, Ng teaches, "*A hash table is used to speed up the storing and retrieving of value numbers*" (see at least col. 7, lines 51-52). In other words, Ng hashes the expressions for fast access, search, retrieve, etc., in extended global value numbering.

Examiner is entitled to give claim limitations their broadest reasonable interpretation in light of the specification. See MPEP 2111 [R-1] Interpretation of Claims-Broadest Reasonable Interpretation.

During patent examination, the pending claims must be given their broadest reasonable interpretation consistent with the specification. Applicant always has the opportunity to amend the claims during the prosecution and broad interpretation by the examiner reduces the possibility that the claims, once issued, will be interpreted more broadly than is justified. In re Prater, 162 USPQ 541, 550-51 (CCPA 1969).

Specification

5. The amendment filed on 6/12/2007 overcomes the rejection to the specification of previous action. Therefore, the rejection is withdrawn.

Claim Objections

6. The amendment filed on 6/12/2007 overcomes the rejection set forth to claims 1, 10 and 19 of previous action. Therefore, the rejection is withdrawn.

Claim Rejections - 35 USC § 112

7. The amendment filed on 6/12/2007 overcomes the rejection set forth to claims 2, 3, 6, 11, 12, 15 and 20 of previous action. Therefore, the rejection is withdrawn.

Claim Rejections - 35 USC § 101

8. The amendment filed on 6/12/2007 overcomes the rejection set forth to claims 1-21 of previous action. Therefore, the rejection is withdrawn.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-7, 9-15 and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Ng (United States Patent No.: 6,035,124).

As per claims 1 and 10:

Ng discloses:

- for an instruction having an operation code and value numbers of a plurality of sources:
    - o hashing an operation code and value numbers of a plurality of sources to generate a first hash value (see at least col. 6, lines 13-14 "***hashing for***

x2+y0 obtains two different values for x0+y0 and x1+y0, respectively" also see at least "***TABLE A"*** for more details);

- retrieving an operation value number from a first hash table based on the first hash value (see at least col. 7, lines 51-52 "***A hash table is used to speed up the storing and retrieval of value numbers***"; also see at least col. 8, lines 27-28 "***if value numbers are not equal, then a new value number is formed and assigned if not already assigned***" – retrieving the value numbers from the hash table must performed in order to compare the value numbers);
- generating a result value number based on a previous bit hash value and the operation value number (see at least col. 8, lines 27-28 "***if value numbers are not equal, then a new value number is formed and assigned if not already assigned***"); and
- searching a second hash table using the result value number (see at least col. 10, line 26 "***redundancy may be determined by a lookup each time any code is moved***" – the idea is look up the hash table for determining redundancy).

As per claims 2 and 11:

Ng further discloses:

- if the result value numbering is found within the second hash table, retrieving an output of the instruction from the second hash table (see at least col. 9, lines 36-

38 "***if a value number has been assigned to the LHS (left hand side), then processing continues to decision block 525 to determine if any right hand side (RHS) operands of the current expression have an unknown value number***" – meaning, if a value number is found, a determination of RHS operands is performed, and in order to perform the determination, the value number of the operands must retrieve from the hash table to compare).

As per claims 3 and 12:

Ng further discloses:

- if the result value numbering is not found within the second has table, writing the operation value number to the second hash table (see at least col. 9, lines 22-24 "***if no value number has been assigned to the LHS (left hand side), then process block 520 creates and assigns a new unique value number to the LHS***").

As per claims 4 and 13:

Ng further discloses:

- prior to generating a result value number, retrieving the previous bit hash value (see at least col. 8, lines 27-28; ***it is inherent in Ng's method. In order to generate a new value number, previous bit hash value must retrieve to perform the comparison)***.

As per claims 5 and 14:

Ng further discloses:

- prior to retrieve the operation value number, comparing the first hash value with a first hash table (see at least col. 8, lines 27-28; ***it is inherent in Ng's method. In order to generate a new value number, a comparison between the hash value number with the hash table must perform to find out if it is redundant***).

As per claims 6 and 15:

Ng further discloses:

- if the first hash value is not within the first hash table, assigning the first hash value a multiple component has value (see at least col. 8, lines 27-28 "***if value numbers not equal, then a new value number is formed and assigned if not already assigned***").

As per claims 7 and 16:

Ng further discloses:

- wherein the operation value number is an n-tuple number (see at least col. 6, line 3 "***xi (i.e., x0, x1, x2,...)***"; also see at least col. 6, lines 51-54 "***All expressions that look lexically the same (e.g., x0+y0, x1+y1, x2+y2) together with all other expressions sharing the same value numbers with these lexically similar expressions***").

As per claims 9 and 18:

Ng further discloses:

- wherein the operation code and the value numbers are disposed within an instruction, the instruction further including a previous bit and a write mask (see for example, ***FIG. 6, and texts for further expand it features***; also see at least col. 9, lines 20-67 "***Hash Table***").

As per claim 19:

Ng further discloses:

- for an instruction having an operation code and value numbers of a plurality of sources:
    - hashing an operation code and value numbers of a plurality of sources to generate a first hash value (see at least col. 6, lines 13-14 "***hashing for x2+y0 obtains two different values for x0+y0 and x1+y0, respectively***"; also see "***TABLE A"*** for more details);
    - comparing the first hash value with a first hash table (see at least col. 8, lines 27-28; ***it is inherent in Ng's method. In order to generate a new value number, a comparison between the hash value number with the hash table must perform to find out if it is redundant***);
    - retrieving an operation value number from a first hash table based on the first hash value (see at least col. 7, lines 51-52 "***A hash table is used to speed up the storing and retrieval of value numbers***"; also see at least

col. 8, lines 27-28 "***if value numbers are not equal, then a new value number is formed and assigned if not already assigned***" – meaning retrieving the value number from the hash table must performed in order to compare the value numbers);

- retrieving the previous bit hash value (see at least col. 8, lines 27-28; ***it is inherent in Ng's method. In order to generate a new value number, previous bit (can be previous value number or opcode or any operand value) hash value must retrieve to perform the comparison***);
- generating a result value number based on a previous bit hash value and the operation value number (see at least col. 8, lines 27-28 "***if value numbers are not equal, then a new value number is formed and assigned if not already assigned***"); and
- searching a second hash table using the result value number (see at least col. 10, line 26 "***redundancy may be determined by a lookup each time any code is moved***" – the idea is look up the hash table for determining redundancy);
- if the result value numbering is found within the second hash table, retrieving an output of the instruction from the second hash table (see at least col. 9, lines 36-38 "***if a value number has been assigned to the LHS (left hand side), then processing continues to decision block 525 to determine if any right hand side (RHS) operands of the current expression have an unknown value number***" – this means, if a value

number is found, a determination of RHS operands is performed, and in order to perform the determination, the value number of the operands must retrieve from the hash table to compare); and

- if the result value numbering is not found within the second has table, writing the operation value number to the second hash table (see at least col. 9, lines 22-24 "***if no value number has been assigned to the LHS (left hand side), then process block 520 creates and assigns a new unique value number to the LHS***").

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 8, 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ng (United States Patent No.: 6,035,124), in view of Dinkjian et al. (United States Patent No.: 5,465,374).

As per claims 8, 16 and 21:

Ng discloses the method as in claim 1 above, but does not explicitly disclose the use of write mask.

However, Dinkjian discloses an analogous method using write mask for writing data into memory (see at least col. 4, lines 14-15 "***the write mask is used in the MOVE instruction to write the data string into a new memory location***").

Therefore, it would have been obvious to one having an ordinary skill in the art at the time the invention was made to modify Ng's method to include write mask in the instructions to store a Boolean value for value numbering. One of ordinary skill in the art would have been motivated to use write mask to write data to memory.

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip H. Nguyen whose telephone number is (571)

270-1070. The examiner can normally be reached on Monday - Thursday 10:00 AM - 3:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wei Y. Zhen can be reached on (571) 272-3708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PN
8/24/2007

WEI ZHEN
SUPERVISORY PATENT EXAMINER